

AVIATION

The Oldest American Aeronautical Magazine

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AVIATION
August 1933

Single engine biplane, carrying mail and passengers



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AVIATION

The Oldest American Commercial Magazine

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A total of 26,827 passengers flew with Eastern Air Transport during the first half

of 1933, as compared with 16,018 during the same period of 1932. Each of the past four months has set a new record for passenger volume. June showed a gain of 16% over the same month of 1932.

WRIGHT is as proud as Eastern Air Transport of this achievement. Credit for this tremendous growth is due to Eastern Air Transport's operating efficiency aided by the dependable and reliable performance of WRIGHT ENGINES.



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The Glean L. Martin Company

Baltimore, Maryland, U. S. A.

Builders of Dependable Aircraft Since 1909

AVIATION
FOR AUGUST 1933

THE new Martin Bomber for the U. S. Army is truly a pioneer—a noteworthy addition to the test flying achievements of the Martin organization. In the summer of 1928 the Army approved the four-engine, underlying new Martin developments in wing, fuselage and tail construction. Two years later came recognition of the Martin. This brought the design more complete. And entirely new standards of performance were introduced in the soaring world.

The new Martin Bomber is, by a wide margin, the fastest twin-engined plane ever built. It could cross the United States from Baltimore to San Francisco in 16 hours if necessary for transport use, it would carry 20 passengers. It makes 250 miles per gallon of fuel, although it weighs as much as a big limousine. It can fly at 10,000 feet and travel at twice that rate. It will climb to nearly 4,000 feet under full load and maintain that altitude with both the pilot's feet off the rudder bar!

These and other new performance qualities are the result of improvements. Martin improvements in aerodynamics, in structures, in controls, in propeller efficiency, and those discoveries of Martin engineers, although applied first to a military plane, have an important peacetime significance. For transport operators they point the way to a great advance in pay load per mile per hour. Applied to commercial planes, they will enable the transportation for air mail, more of the time and more profitably than the best that man knew today.

In 1933, even more than in past years, the story of the National Air Races is an engine builder's story. Never before has there been such a dearth of aerodynamic improvement as during the period between the last two races. With the brilliant example of transport plane development in recent months to serve as a stimulus, some of the principles involved ought to find application in next year's racing planes.

Power for performance at the National Air Races

By Franklin R. Colbohm and W. B. Oswald

THIS 1933 National Air Races held at Los Angeles proved very disappointing to those who anticipated an anticipation of seeing the latest developments in aeronautics and engine design. The engine builders and the racing drivers are encouraged and some new fighters were seen in last year's Air Races at Cleveland. There were only two new types on the field, the majority of the planes being those used last year, and the new designs or changes were an exercise in horsepower. The new types were both powered with four-cylinder Monarchs, the one built by Art Chester being driven by hand, while the Larry Brown entry was piloted by Lett Miles.

Speed by brute force

During the past year, most of the racing plane designers have concentrated their efforts on getting additional power and have left credit for improvement in performance to the engine manufacturers. The only indication of the degree of racing planes is the increase of speed of these planes.

There are several interesting examples of this trend that are probably

number to all who read the data pages. One is the famous Miss Powell Gee-Bees which last year was the legitimate speed record of over 250 mph at the time she was built. This year, which was the year she returned to take a supercharged Monarch. Another Gee-Bees, last year powered with a Wasp, this year was stripped up to speed for these wins by changing over to a Whirlie. However, due to the unfortunate change which occurred in the engine parts caused the Beech to withdraw from the Brooklands triangular race, nor did she power at these speeds in Los Angeles to take part in the closed-course speed event, either. Jessie Turner's Wedell-Williams speed, the fastest record in the race was also held and broken from Miss Gee-Bees. To prove what was lost in name, it considers her better performance. As another of the high powered Gee-Bees got through to Los Angeles, there was practically no competition for the Wedell-Williams machine. The picture indicates the Wedell-Williams had a much higher top speed than the Gee-Bees, but her engine had the shortest wing span of any plane present at the meet, or only 14 ft. 4 in. The wing area is just 43 sq. ft. The driving of one of these mighty little racing planes is not and of course patient all the way across the country, as the racing drivers themselves will tell you, but they may be good for something other than crossing planes at top speed, giving a good enough gain. For safety in the smaller displacement classes, the

The small plane enter, of course, much more easily modified and facilitated the operators with very interesting and exciting individual contests. These groups showed great enthusiasm and became an excellent engine class, of both the four and six cylinder types. In fact, only one plane in this class was not Monarch-powered—Williams' "Gulf Oilie" with a 120-hp. Cirrus.

In and out of case power

Williams performed the remarkable feat of flying this little machine all the way from Wisconsin to Los Angeles. To realize the significance of this, the Glean L. Martin company which has built the Monarch has built much the shortest wing span of any plane present at the meet, or only 14 ft. 4 in. The wing area is just 43 sq. ft. The driving of one of these mighty little racing planes is not and of course patient all the way across the country, as the racing drivers themselves will tell you, but they may be good for something other than crossing planes at top speed, giving a good enough gain. For safety in the smaller displacement classes, the

AVIATION
AND THE

air-cooled cooling engines such as the Messerschmitt and Clerget seem to be very dependable, since they sit so easily in the nose and make the disposal of the resultant oil as simple, particularly in the case of the inverted type, with practically no danger of exhaust fumes getting into the cockpit. This problem of oil disposal has, I think, been entirely satisfactorily solved in all the types with the larger radials, although the idea of putting coolant circulation from a point forward of the exhaust manifold over very well with the completely enclosed engine is now being used.

More speed, more control

One of the new Menasco engines had an interesting cooling system which was reported to result in the best cylinder cooling of any gasoline engine of this type. This was an N.A.C.A. type cooling system, which was obtained by allowing a space between the exterior of the engine and the baseplate when mounted inside the case. No louvers were used; instead the air was exhausted from under the engine in the rear case section, as shown in Figure 10. The efficiency of this arrangement has previously been proven by wind tunnel tests and also by actual flight performance when applied in all fighters on some Army observation planes. The cooling system was designed to reduce the speed of the NACA fan, which was also fitted with a Menasco engine, was increased 6 mph. by shortening the housing for the cooling and eliminating the cooling air stream through N.A.C.A. ears. This type of test case was originally prepared to gain information concerning the effect of various features of gusting, a five mph. per hour speed with an increase in engine cooling.

The essential nucleus on most of the planes at the rains were evidently an balanced. Undoubtedly a perfectly safe policy for small ships, but for larger and faster planes it will probably be found necessary to incorporate not only

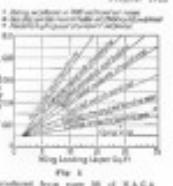


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possibly have been due to the fact that so few new designs were present. Most of those small craft shapes seemed to be rather truly in landing. This condition, while not serious, could undoubtedly be helped considerably by the use of flaps, not only to reduce landing speed but also to cut down the length of run after landing.

Terrestrial crust index

In general, the steering drag on most of the stages could be held constant or reduced. While there seemed to be a rather inefficient design as some cases did not seem to have been optimised for the particular requirements. Wind-tunnel tests of modelled reentry vehicles in atmospheric flight showed that the drag coefficient resistances tested in atmospheric flight could be very well handled, but it was most surprising to note the low drag coefficients obtained by the leading gear fairings on several of the stages. In the stage 1 configuration of year 9 of the atmospheric type, such a large proportion of the total resistance was due to the fairings, every effort should have been made to reduce it to a minimum.



第 2 章 基本概念

AVIATION
April, 1934

one has to a better drag-weight ratio, but well of course by accompanied by an increase in landing speed of the airplane. This is illustrated by the portion of the Get-Box with its high landing speed. Obviously, the most effective way to better the position of the airplane on this chart would be to remove the point dimensioned, which may be accomplished only by reducing the drag.

Shrinking the image

Some designers seem to have been attempting to reduce the total drag coefficient of their planes by putting slats on the wing area. The effect of a change in area upon the total drag of the airplane is illustrated in Fig. 14-1, where the horizontal axis represents the percentage change in chordwise wing area, and the vertical axis represents the change in total drag. The curve shows that there is a difference in a given change in wing area and will result in a different effect on the total drag of airplanes of different configurations.

such higher landing speed. Of course, the plane were rather clean, having drag coefficient at .02, the decrease in total drag would be 12 per cent while a decrease in drag of a flying wing would be 28 per cent. This shows somewhat that cleaning of aircraft designs is of paramount importance, not only because of the higher speed but certainly aircraft but also because of the much increased effect that can be

The curves of Fig. 2 do not allow the increased solute drag which would result from the increase in the viscosity of water. However, since it is indicated along each a small percentage of the total adhesion drag at a given speed in large, soft, and loose soil would change relatively little, this effect may be neglected. Also, the change in weight due to the change in water content is not considered, but since this change will at best for only a small percentage of the time during the test, its influence on the error introduced by the change in weight will be negligible. In addition, the error introduced in this manner in each small sample of soil may be extrapolated for the entire soil mass.

The 3 shows clearly the effect of varying ring area on maximum speed.

[View Details](#)

The foregoing would suffice due to long-plate designers might do well to follow the lead taken by the new designers in striving for maximum clearance with minimum wing and engine-dome designs and acceptable landing gear. With such a clean basic design, any desirable increase in speed could be obtained by cutting down the wing loading.

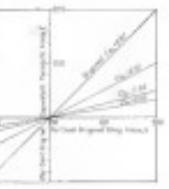
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As suggested by the session, several areas for Sri Lanka's future energy needs

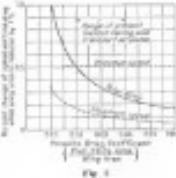
were being used for the preview of the new F-104, which was to become the mainstay. For example, Chuck Hawk's new "Sky Chief," a sleek "Glamour," has a speed envelope of 45 to 300 mph with normal load, and when extreme measures had to be taken, it could fly at 400 mph. The new Douglas rear-mounted transport, the DC-10 T.M.A., another example, gave a speed range of from 60 mph over 200 mph. Also, the Waggoner Gee-bee test plane in the Boulton Paul was reported to have a speed envelope determined by the size of flaps. The effect of wing flaps to be well observed by considering an airplane in the Gee-bee race holder, the present world's high-speed record holder at 404 mph. Assuming a 50 percent increase in lift coefficient, we find that the critical angle of attack is

While the added 10 mg./sq. m. brought about no appreciable and probably permanent increase in resistance, the possible decrease of 35% observed in freezing and rehydration may be explained by the presence of exceedingly high levels of 93 mg./

turning up, it would seem that the next step in design of racing planes should be a canardier monoplane with variable leading edge, having a large wing area and using flap-like high-lift devices to hold the flying speed down to a reasonable figure. It is reported that one of the latest experiments of the wire-braced type of racing plane, Justice Weidell, is comprising a new super-speed ship equipped with a Wright Jr. engine and using these specifications almost to the letter.



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EWING L. TAMM. The Air Mail Department of the Post Office and Department of Commerce. Appointed to assume the supervision of Flying Mail Service in 1931, he was named Director of Air Mail Department in 1933. He is shown here in his office at Washington, D. C., where he has been since 1931. He holds the new title of Director of Air Mail, which will be retained until the reorganization of the Post Office and Department of Commerce. Mr. Tamm is 45, and Mr. Michael A. DeMott, 36, were appointed to succeed him. Mr. DeMott is a graduate of the University of Wisconsin, and has been appointed new to Washington, D. C., as Director of Air Mail. He succeeds Mr. Tamm in the new title of Director of Air Mail, which will be retained until the reorganization of the Post Office and Department of Commerce. Mr. DeMott is now serving in his first position.



JAMES C. EDGERION. First on the list of newly selected administrators for mail flight in history, Captain C. Michael DeMott resigned his commission in the U. S. Army to assume further responsibilities as the new mail service's chief air route representative. He has taken over the Department of Commerce's responsibility of supervising mail and airmail operations of the International Correspondence Publishers' program. In addition, he has become a member of the Transportation and International Correspondence Committees, and in June he was appointed Executive Assistant to the Assistant Secretary of Commerce. He was born in Colorado, Sept. 2, 1894.



GEORGE L. MARTIN. One of the founders of the National Legion, George L. Martin, who has now entirely identified with air mail, was born in 1888 when he was made a member of the 10th Cavalry, U.S. Cavalry. The new head of the Air Mail Department was born in Modesto, Calif., April 18, 1897, and attended the University of California and the University of Oregon. The new head of the Air Mail Department was born in Modesto, Calif., April 18, 1897, and attended the University of California and the University of Oregon. The new head of the Air Mail Department was born in Modesto, Calif., April 18, 1897, and attended the University of California and the University of Oregon. The new head of the Air Mail Department was born in Modesto, Calif., April 18, 1897, and attended the University of California and the University of Oregon. The new head of the Air Mail Department was born in Modesto, Calif., April 18, 1897, and attended the University of California and the University of Oregon.



J. EDWARD LOWE. Under the name of Bill McRae, he was known as a pilot and instructor at Southern Illinois, Southern, and Northwestern. In October 1911 he enlisted in the Army Air Corps and served there until 1918. After the war he became a pilot and passenger on the Atlantic coast. He became interested in the Atlantic Coast Air Service Company, in 1921, and became its president. In 1923 he joined the Bureau of Air Commerce. Since 1926 he has held various positions in the Bureau of Air Commerce, including that of Director of Air Mail. He has been elected as Director of Air Commerce for the year 1933-1934.

New faces

Administrators of the

and new policies in Washington

"new deal" for aeronautics in the Department of Commerce, and what they have to say

BY THE coming industry grows through its first major change in a national policy, many gains and losses are inevitable, and the new administration. The new appointments are being cautiously watched.

Prominently at the forefront in high political positions on the Department of Commerce have been good enough to respond to our request and prepare statements of their views of flying mail, flying airmail, and flying express.

It is

not until now that we can

see the full extent of the changes

which have been made in the

Department of Commerce by the

newly elected Congress.

The new administration has

been given a mandate to

reorganize the Government, and

the new Congress has

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since it is apparent that this phase of aviation will result in a surprising degree of economic expansion.

The reduced appropriations for the Air Resources Department should result in more increased efficiency rather than in any harmful restriction of its present work.

Rex Martin

Director for Strategic

IT IS TAKING over the direction of the public safety program that I am pleased with the efficiency with which this great system presently operates, the magnitude of its construction, the competence of its personnel and the possibilities which exist for the future.

Although nearly 20,000 miles of airways have been developed, it is preferable to state that the task of creating a national system of airways is not at all yet complete. There are many blank spaces in the picture.

Technical advances in modern aircraft have already made obsolete, many existing types. The new and leading developments in aircraft design and the careful study of present applications, lead a determination of policy regarding modernization and use.

Introducing heavier fields speeded by 1938 flying equipment may not in many instances adequately meet the requirements of field equipment. Some may no longer be required, others may be improved.

How to meet these changing conditions and maintain the existing strengths on a very much reduced budget is the task that I face. I expect to meet it successfully.

In the meantime, I feel enabled to thank the distinguished officers of the entire personnel of the Airways Division.

At the earliest possible time I shall inspect the entire system and meet those directly charged with its successful operation. Such projects as are being considered will be carefully evaluated and carefully studied with a view to their economic usefulness.

It should be obvious that with production being pushed to 30 hours per seats transportation costs are going higher. This is true, and must be met by the industry. No other agency or transportation officer can do so. To achieve the best possible results, certain new policies appear necessary, as well as a reorientation of existing ones and programs.

Present appropriations do not provide any funds for new construction or the maintenance of existing airports and fields. An effort, however, is being made in secure funds from the Public Works Administration for these purposes. Should we be successful in securing such funds, expenditures will be made purely on the basis of planned economy.

In conclusion, I hope to say that I offer the aviation industry the services of my office to cooperate fully in all matters that will advance the industry.

To return I feel a greater measure of co-operation by the industry with those who will be serving with me.

J. Carroll Cone

Director for Aeronautic Development

ACHIEVEMENTS standing to the credit of the Aviation Development Service of the Aeronautics Branch cover a wide range of activities related to flying. Some of them are fundamental which will have a profound effect upon the future of air transportation, like the development of a radio navigation system.

Others are of a less permanent nature, for in most of its activities the Aviation Development Service works behind the scenes.

Research on aids to air navigation

and other problems relating to flying, development of aircraft design, the coordination of air navigation, maintenance and fostering of airport development are the important phases of this service. All tend to progress in the sciences and techniques of flying.

As the new Aviation Director for Aeronautic Development I recognize the importance of developing research areas which complement the need for basic knowledge as now carried out. Correspondingly, there will be no radical departure from previous policies. As in the past, the Aviation Development Service will endeavor to co-ordinate its activities with those of the industry.

However another task has to be

AVIATION

August, 1938

considered in place for the standardization of aircraft systems appropriate with the American aircraft and to serve to work in the coming fiscal year. This difficulty, of course, is one which faces all other agencies of the Federal Government. With respect to the Aviation Development Service, a general solution will be proposed to be recommended to Congress immediately and adopted. It may mean that some research work will be discontinued but important investigations in aeronautical radio will be retained. A shortage of funds for promoting has necessitated changing the Air Corps' radio navigation system to a more mobile performance. Notices concerning airports and airways formerly carried therein now appear in a weekly aeronautical bulletin bearing the title, "Weekly Motion to Airways," which, incidentally, enables the Aviation Development Service to keep this important information available at more frequent intervals than in the past.

The activities of the Aviation Development Service have been important to the industry in the past, and they are far more so at this time, when the airlines, factories and other business enterprises are faced with the problem of surviving through a period of trying economic difficulties. The Aviation Development Service will endeavor, in its promotional work, to play the same rôle during a period of economic recovery that it had done during a time of unusual business expansion, and bear during a world-wide depression.

Improved Safety Belts

ONE of the newest developments with which passengers and operators here to extend in the safety belt. If the belt is too obvious or is too cumbersome, it is likely not only to encourage passengers to bypass the safety belt but also to reduce the effectiveness of its impact effect. Since passengers vary greatly in overall dimensions, some form of quick adjustment of straps should be provided, but the standard snap buckle type safety belt with its multiple of straps and track buckles falls into the mark for transport use.



Officials of Transcontinental and Western Air, Inc., have done some intensive work on the problem, and a new type of belt has been adopted under the name of the "T. & W. A. Safety Belt," supervisor of operations, which is now undergoing strict service testing in one of T. & W. A.'s shops. As indicated in the accompanying photograph, the latching arrangement is attached to the opposite side of the chair frame. The passenger, after fastening the strap, can step through the harness and pull it down to the desired tension and release it. An eccentric cam wedges the strap firmly in place so that it cannot be withdrawn. To isolate himself, the passenger merely pushes the plunger located on the left arm of the chair and then stands up.

The advantages of such a belt are obvious. These are so obvious to be set aside inadvertently as to be furnished with unsecured funds. The adjustment to the individual user is rapid and automatic, and the necessary strap length is quickly obtained and conveniently secured. The appearance of the seat is improved by the elimination of loose ends of straps and webbing.

AVIATION

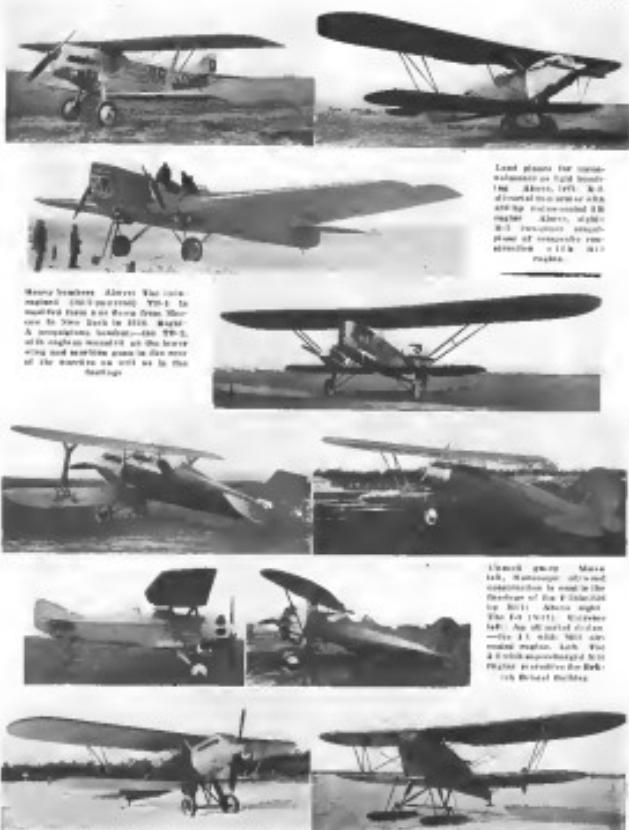
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Visitors from Italy

A peaceful invasion by Il Duce's squadrons

Machine gun belts from the R.A.F. and American P-40s add further glamour. The M-10s are shown in the foreground. Below: the same scene at Gherzelle.



Soviet aircraft types. Above, left: An early-type Ilyushin IL-2 (I-16T) - 475-mm-chord fighter and reconnaissance aircraft. Above right: An improved IL-2 with 500-mm-chord tail boomer. Center left: Machines are armed to increase range of fire and the intercooler radiator of the 300-hp M-17 engine has been replaced by one of the latest type.

Land planes for military purposes or light bombers. Above, left: AIl-2, armoured to a certain extent against ground fire, with the 300-hp M-17 engine, intercooler radiator removed, and the 500-mm-chord wings.

Heavy Bomber. Above: The main engine, 2000-hp, Yer-2. It must have been built in Moscow before 1939. In 1939, Moscow became the center of the U.S.S.R., with engine research on the heavy and medium planes in the rear of the country as well as in the front.

Light Plane. Above: Ilyushin IL-2, armoured to a certain extent against ground fire, with the 300-hp M-17 engine, intercooler radiator removed, and the 500-mm-chord wings.



Medium Bomber. Above: Medium bomber, armoured to a certain extent against ground fire, with the 300-hp M-17 engine. Below: Left: An off-metal fighter, armoured to a certain extent, with the 300-hp M-17 engine. Both: Right: A twin-engine fighter, 300-hp M-17 engines.



Reconnaissance aircraft. Above, left: An early-type IL-2 (I-16T) - 475-mm-chord fighter and reconnaissance aircraft. Above right: An improved IL-2 with 500-mm-chord tail boomer. Center left: Machines are armed to increase range of fire and the intercooler radiator of the 300-hp M-17 engine has been replaced by one of the latest type.

Along with the vast program of industrialisation in Russia is the equally important problem of providing adequate defenses for a territory of tremendous size. While it is common knowledge that much energy is being devoted to the upbuilding of the Soviet Air Forces, detailed information is extremely scarce and most of it is derived with personal opinion or impression gained in limited observation. We are particularly fortunate in having for the author of this article one of our military airmen whose association with Russian aeromarines dates back to the early years of the Soviet Government and who is taking an active part in its development at the present time.

The equipment of air forces

THE UNION OF SOVIET SOCIALIST REPUBLICS

By Arthur A. Adams

Board of Directors, United Aircraft Institute of the U.S.S.R.

AIRCRAFT played an important role in the victories of the Russian forces during the World War. The development of the aerial art forces of the U.S.S.R. began in the year 1917. It is interesting to note that the armed air forces of the Soviet Union were largely composed of types of imported planes and some replicas captured from invading armies during the Civil War.

The types of planes developed during the period classified as ordinary Reconnaissance Planes and Light Bombers, Tu-2 Heavy Bombers and Transport Carriers, I-153 Heavy Bombers and Transport Planes, SU-20 semi-Person Planes, MBR and MDR Reconnaissance Seaplanes and D and MU—Training Planes for land and sea.

Construction materials

Rodling aluminum, an aluminum alloy of the duralumin type developed in the U.S.S.R. in one of the most modern plants, is used for aircraft construction. It differs from the conventional duralumin and elsewhere by the presence of some metal and possesses unique properties that make the Russian designer prefer it to ordinary aluminum.

Propeller control, Rodling aluminum provides better performance than copper. Its tensile strength is 36,200 lb./sq.in. with an elongation of 14 per cent good machinability and it requires very slight processes for shaping, etc.

Sherman aviation pine—a timber with a specific weight of 652 denarius in aircraft of composite design, where

wood is still required, satisfactorily replacing the well known spruce used in aircraft aviation.

Wooden fairings are common. Oxygen tanks and other steel cylinders are made of steel, well as magnesium alloys of the Electron type are used in their construction.

Reconnaissance land planes

Airplanes of the SU class are used for land reconnaissance and for light bombing.

The SU-20 which carries two passengers for land and sea reconnaissance. Each trip are well known as aviation cycles. Their chief characteristics are outlined in Table 1.

The SU-2 plane with 480 hp. water-cooled M-17 engine, a two-seater aircraft used for land reconnaissance or light bombing. It is an all-metal plane constructed mainly of Rodling aluminum, although some steel is used.

All the piloting devices and engine controls are mounted on the floor under the cockpit. The left armrest of the floor carries a stationary machine gun firing through the propeller and operated by the pilot.

The rear cockpit is for the observer. It also carries control stick, navigating and engine control instruments, photographic equipment, etc. The rear cockpit is equipped with two pointed serrated guns and revolving device (rotating pistol). The rear section of the fuselage is triangular with helping sides and apex downward.

The vehicle is composed of upper and lower wings of an original profile

known as the "ANT." Both upper and lower wings are rectangular with rounded tips. The upper and lower wings are smaller than those of the upper. The wings are braced with two Y-shaped struts and struts are joined with the fuselage. The upper wing alone has ailerons. The tail group consists of a stabilizer, balanced rudder and rudder. Horn type compensation is used exclusively. Camouflaged aluminum covering is used for the fuselage, wings, tail and struts.

The landing gear is composed of two separate axles each with two steers, forming a triangular position with downward slope. The upper ends of the split axles are fitted into one joint of the lower longitudinal of the fuselage. The landing gear is made of steel tubing.

The SU-2 plane with 420-hp, water-cooled M-17 engine is a two-seater aircraft equipped and armed for land reconnaissance and light bombing.

The SU-20 plane with 480-hp, water-cooled M-17 engine is a two-seater aircraft having a fuselage of rectangular cross section with semi-circular nose and upper surface. The wings are rectangular in plan form with rounded elliptical tips. The upper wing has the larger span and the other is characterized by negative camber. The landing gear struts are fitted by a pair of M-3 struts and wires. All the carburetors and the landing gear are fitted covered excepting the front part which is covered with Rodling aluminum. The landing gear is fitted with rubber shock absorbers on the forward

Cabins for the pilot and the observer are in tandem with the pilot's cockpit forward.

Reversed ailerons are found on the upper wing only. Stabilizers and rudders are of the conventional type.

Table 1. Weights and sizes of reconnaissance planes

	lb. with M-10 engine	lb. with M-12 engine
Gross weight (lb.)	4,610	4,610
Load (lb.)	1,140	1,140
Total height (ft.)	10.6	11.2
Load (lb. per cu. ft.)	11.6	11.2
Length (ft. 10 in.)	34.5	34.5
Width (ft. 10 in.)	10.5	10.5
Span (ft. 10 in.)	36.0	36.0
Length (ft. 10 in.)	34.0	34.0
Width (ft. 10 in.)	6.9	7.0
Span (ft. 10 in.)	36.0	36.0
Total load (lb.)	388.8	349.8

Table 2. Performance of reconnaissance planes

	lb. with M-10 engine	lb. with M-12 engine
Maximum speed on level	160	160
in ft. sec.	10.0	10.0
Minimum speed (ft. 10 in.)	127	127
Ceiling (ft. 10 in.)	18	18
Climb to 10,000 ft. (min.)	44.4	44.4
Service ceiling (ft.)	11,400	11,400
Range (miles)	500	500

Boomers

Mit-10-engine plane classified "TB" belongs this group. The Soviet aircraft industry has produced the following four types: TB-1 with two M-10 engines; TB-2 with two M-12 engines; TB-3 with one M-10 engine; and TB-4 with one M-12 engine.

The TB-1 with one M-10 water-cooled engine is intended for heavy bombers or for use as a torpedo carrier. Its landing gear can be replaced by floats. To design the TB-1 is an all-metal monoplane, low-wing monoplane. Ribs strengthen the fuselage at the rear section of the engine nacelle, and the landing gear, engine mounting and certain joints.

Two 60-hp water-cooled M-10 air-cooled engine in pusher plan. These are placed in front of the wings so that they are well protected from the rear and are supported by three propellers.

The crew members sit in two places: a leader and three observers. The forward part of the fuselage carries a rearward-firing machine gun for the lead observer. Next comes the bombing station consisting of the bombing equipment, lighting equipment, etc. Obscured, with instruments for the engines are located behind the pilot's cockpit, as well as passengers' seats. The wings, used to hold the fuel tanks and engines. A bridge from the passenger bay to the engine cockpit is held by the rear of the longitudinal beam of the plane with the center and outer observers. The bridge passes between both racks of委员 type located in

the sides of the central section of the fuselage. The central and rear observers each have a hatch with two rows of seats in the top and bottom sections of the rear cockpit. Both hatches open to the rear and give access to either side of the fuselage.

The wing consists of a center section integral with the fuselage and two separate panels. Both front and rear surfaces of the fuselage are dihedral and are hinged to the central part. Front and rear parts of the fuselage section are also dihedral. A double decker landing gear installation of the fuel tanks, servicing site.

The landing gear has two separate axles. The long end of each member of the divided axle includes a special and strong shock absorber of the type of a coil spring. The short, horizontal end of each axle which carries the wheel is attached with the aid of coil shock absorbers to the supporting girder of the landing gear placed vertically in the place of the corresponding engine. The upper ends of the axles are fastened at the lower ends of the fuselage.

Rudder and stabilizers are adjustable and of conventional type. Two tailored steel struts brace the stabilizer from underneath. Landing gear can be replaced with floats supported by a system which allows it to be attached to the boat platform at the lower surface of the center section.

The TB-1 type plane with 230-hp M-10 engine modified for certain flying is known to the American public in consequence of its Moscow New York flight in 1933, as the "Soviet Sparrow."

The TB-2 with two M-12 engines represents the heavy bomber class. This plane is of composite construction with an engine of chrome-molybdenum steel tubing in lower wing of Krylov-

Table 3. Weights and sizes of bombing planes

	TB-1 with one M-10	TB-2 with two M-12
Maximum weight (lb.)	4,000	16,430
Load (lb.)	1,000	1,000
Total height (ft.)	12.2	12.4
Load (lb. per cu. ft.)	2.6	2.6
Length (ft. 10 in.)	39.0	39.0
Width (ft. 10 in.)	12.0	12.0
Span (ft. 10 in.)	39.0	39.0
Total load (lb.)	3,000	15,430
Range (miles)	500	500

Table 4. Performance of bombing planes

	TB-1 with one M-10	TB-2 with two M-12
Stalling speed on level	60	64
Landing speed (ft. 10 in.)	30	32
Ceiling (ft. 10 in.)	18	18
Service ceiling (ft.)	19,000	14,400
Range (miles)	500	500

Table 5. Weights and sizes of pursuit planes (single seater)

	lb. with M-10	lb. with M-12
Gross weight (lb.)	3,100	3,100
Load (lb.)	1,000	1,000
Total height (ft.)	8.0	8.0
Load (lb. per cu. ft.)	1.2	1.2
Length (ft. 10 in.)	20.8	20.8
Width (ft. 10 in.)	4.0	4.0
Span (ft. 10 in.)	26.4	26.4
Total load (lb.)	2,100	2,100

Table 6. Performance of single seater pursuit planes

	lb. with M-10	lb. with M-12
Maximum speed on level	150	150
in ft. sec.	10.0	10.0
Minimum speed (ft. 10 in.)	100	100
Ceiling (ft. 10 in.)	18	18
Service ceiling (ft.)	19,000	18,000

Table 7. Weights and sizes of pursuit planes

	lb. with M-10	lb. with M-12
Gross weight (lb.)	3,100	3,100
Load (lb.)	1,000	1,000
Total height (ft.)	8.0	8.0
Load (lb. per cu. ft.)	1.2	1.2
Length (ft. 10 in.)	20.8	20.8
Width (ft. 10 in.)	4.0	4.0
Span (ft. 10 in.)	26.4	26.4
Total load (lb.)	2,100	2,100

Table 8. Weights and sizes of pursuit planes (single seater)

	lb. with M-10	lb. with M-12
Gross weight (lb.)	3,100	3,100
Load (lb.)	1,000	1,000
Total height (ft.)	8.0	8.0
Load (lb. per cu. ft.)	1.2	1.2
Length (ft. 10 in.)	20.8	20.8
Width (ft. 10 in.)	4.0	4.0
Span (ft. 10 in.)	26.4	26.4
Total load (lb.)	2,100	2,100

fuselage is of monocoque type built up of plywood. The plane is armed with two stationary machine guns firing through the propeller hub.

The type TB-3 classified as "T" compose this group. Pursuit planes with more than two engines known as MI also known as MI-1. Information publications do these planes as not available at the present time.

The MI-1 is of U.S.A.R. type. The aircraft was first employed in 1936. The MI-1 and MI-2 were originally employed and are now employed in the following types of pursuit planes: 1-MI, 1-3 with M-10 engine, 1-4 with M-12 engine, 1-5 with M-12 engine, 1-6 with M-12 engine.

1-MI is a biplane of composite construction with two M-10 engines by water-cooled M-10 engine.

The wings consist of a high upper wing and two lower wing panels joined by X-shaped struts and reinforced with diagonal wire bracing. The plane is built of Kokchet-

avangard wood with the exception of the landing gear and certain parts. Configuration: tailless monoplane with two stationary machine guns firing through the propeller hub.

The type 1-3 with a 650-hp water-cooled M-12 engine is a biplane of composite construction with a single shape fuselage cross-section. The wings are rectangular in plan form with rounded tips and fabric covered. Upper wing is of equal chord and has a pair of N-shaped struts and reinforced wires. The wings are staggered pairwise. The upper wing spans is greater than that of the lower. The leading edge is of metal with rubber shock absorbers on the front main and is slightly inclined to the center of gravity of the plane. The pilot's cockpit is located at the center of the fuselage.

The 1-4 plane with a 430-hp by air-cooled engine in a single seater configuration with two M-12 engines by water-cooled M-12 engine.

The wings consist of a high upper wing and two lower wing panels joined by X-shaped struts and reinforced with diagonal wire bracing. The plane is built of Kokchet-

avangard wood with the exception of the landing gear and certain parts. Configuration: tailless monoplane with two stationary machine guns firing through the propeller hub.

The type 1-5 with a 650-hp water-cooled M-12 engine is a biplane of composite construction with a single shape fuselage cross-section. The wings are rectangular in plan form with rounded tips and fabric covered. Upper wing is of equal chord and has a pair of N-shaped struts and reinforced wires. The wings are staggered pairwise. The upper wing spans is greater than that of the lower. The leading edge is of metal with rubber shock absorbers on the front main and is slightly inclined to the center of gravity of the plane. The pilot's cockpit is located at the center of the fuselage.

The 1-6 plane with a 650-hp water-cooled M-12 engine is a biplane of composite construction with a single shape fuselage cross-section. The wings are rectangular in plan form with rounded tips and fabric covered. Upper wing is of equal chord and has a pair of N-shaped struts and reinforced wires. The wings are staggered pairwise. The upper wing spans is greater than that of the lower. The leading edge is of metal with rubber shock absorbers on the front main and is slightly inclined to the center of gravity of the plane. The pilot's cockpit is located at the center of the fuselage.

1-MI is a biplane of composite construction with two M-10 engines by water-cooled M-10 engine.

The wings consist of a high upper wing and two lower wing panels joined by X-shaped struts and reinforced with diagonal wire bracing. The plane is built of Kokchet-



Reconnaissance monoplane. Above, left: A biplane plane monoplane in used as the TB-1. The TB-1 is a single-seat biplane with a high-wing monoplane configuration. The wings are held with wooden struts and fabric. Right: For the new monoplane MI-1. MI-1 is a single-seat biplane with a high-wing monoplane configuration. The wings are held with wooden struts and fabric. Below: The MI-1 monoplane.

Wooden struts. Below, right: The MI-1 with 100-hp air-cooled M-10 engine is available with landing gear as a single-seat biplane. Below, far right: The MI-1 with 100-hp air-cooled M-10 engine is available with landing gear as a single-seat biplane. Below, far right: The MI-1 with 100-hp air-cooled M-10 engine is available with landing gear as a single-seat biplane.

Below, right: The MI-1 monoplane.



taking off. EG-J or the disassembly shown in Figure 10 is often done.

Kirking-disassembly sequence

Starting in the article section, each end of the fuselage tail plane assembly is cut away from the main aircraft structure. This section is treated as a separate to plane assembly disengaged for work service.

The M-13 with M-12 engine is a flying boat with floats on the lower fuselage section under the rear armament. The float is joined to the hull, rear-engine, stabilizers and rudders. The wings and wing floats are made of wood. Wings are removed with pliers. The engine is placed between the tail and the center section and is equipped with a four-bladed pusher propeller. The tail is of the double-tail type and is held in place by seven wire-tightenings and is attached to the front compartment of the boat has a watertight bottom and side air shanties.

The M-13 "ROM" with two M-12 engines is intended for open sky racing. It has a single hull, a single rudder and an upper wing made of wood. In upper wing is made of wood and covered with pliers.

The lower wing which has a very small span (25 ft.) is joined to the upper wing by carbon struts. To an inner cross tube necessary small floats are placed at the rear of the lower wing. The upper wing is placed above the boat and the two M-12 engines with tractor propeller are placed on its center section. The hull is of double tail construction.

The M-13-2 plane with 2,317 mgs. is like a long distance racer containing its boat. There is a monoplane

wings are wings directly attached to the upper part of the boat. In two engines are placed on top of the wing an engine is connected with propeller. Kirking-disassembly is used throughout excepting for several steel parts, the boat bottom is built of steel.

Trucking planes

Two types of trucking planes are used, the U-2 with 180 hp air-cooled M-11 engine, a tail-type and the M-12 with 220 h.p. air-cooled engine. The former can also be used with floats.

The U-2 with M-11 engine is a bi-plane with rectangular wings mounted on the top and bottom by 24 struts. In upper wing is made of wood and is attached to the fuselage by a pair of N struts. The landing gear is like those previously described. This plane can be placed on a landing gear consisting of a single float and two additional small floats placed on the lower wing.

The M-12 with 220 hp. in the boat bi-planes with floats on the lower wings and is equipped with a 180 hp. air-cooled M-11 engine. Kirking-disassembly is used for its construction, such the en-

velope of the wings and floats which are of wood.

The boat has a single keel. The plane is equipped with floats for covering on the harbor.

Table 11. Weights and sizes of
trucking planes

	M-11 with U-2 with M-11 engine	M-12 with M-12 engine
Gross weight (lb.)	1,911	2,342
Empty weight (lb.)	1,111	1,421
Tread width (in.)	30.1	26.5
Load (lb. per sq. ft.)	2.2	2.2
Load (lb. per square ft.)	16.9	15.5
Length (ft.)	32.9	30.7
Length (in.)	37.4	36.7
Length (in.)	10.2	9.5
Width (in.)	4.2	4.2
Spanwise dimensions (in. 8)	101.8	101.2

Table 12. Trucking plane performance

	M-11 with U-2 with M-11 engine	M-12 with M-12 engine
Maximum speed (miles per hour)	96	98
Landing speed (miles per hour)	20.8	20.8
Climb rate (feet per second)	20.8	19.5
Service ceiling (feet)	13,020	13,400



Airport lighting control desk

HIGH UP on the tower of the administration building of Pittsburgh's new Allegheny County Airport the dispatcher sits at a desk that gives him almost finger-tip control of the arrival and departure of planes. As the day begins he turns on the power to the system. The power system, complete with lights, with a read indicator set in flush with the surface. Immediately below are the control switches. Following and

depending planes receive information

Table 9. Weights and sizes of
recreational airplanes

	M-11 with M-11 engine	M-12 with M-12 engine
Gross weight (lb.)	1,691	1,881
Empty weight (lb.)	1,026	1,040
Weight carrying (lb.)	665	840
Tread width (in.)	33.0	30.5
Load (lb. per sq. ft.)	2.0	2.0
Length (in.)	33.3	30.8
Width (in.)	4.2	4.2
Spanwise dimensions (in. 8)	101.8	101.2
Height (in.)	10.2	9.5
Length (in.)	37.4	36.7
Width (in.)	4.2	4.2
Spanwise dimensions (in. 8)	101.8	101.2

Table 10. Performance of recrea-
tional airplanes

	M-11 with M-11 engine	M-12 with M-12 engine
Maximum speed (miles per hour)	98	100
Empty weight (lb.)	1,026	1,040
Weight carrying (lb.)	665	840
Tread width (in.)	33.0	30.5
Load (lb. per sq. ft.)	2.0	2.0
Length (in.)	33.3	30.8
Width (in.)	4.2	4.2
Spanwise dimensions (in. 8)	101.8	101.2
Height (in.)	10.2	9.5
Length (in.)	37.4	36.7
Width (in.)	4.2	4.2
Spanwise dimensions (in. 8)	101.8	101.2

An account of the servicing and supply activities of Pacific Airmotive Corporation, Ltd.

A West Coast servicing unit

RANKING as one of the largest independent commercial aviation organizations in the country, Pacific Airmotive Corporation, Ltd., incorporates within one plant at Los Angeles Airport (Burbank, Calif.) facilities for repairing aircraft engines, more than 100,000 square feet of office space, and a factory serving aircraft in California, Oregon, Washington, and Alaska. The company's repair service includes major complete overhauls of engines, and an aerial repair service on airplanes and parts, including Hispano-Suiza, Standard propellers, and Bessels wheels and tires. Located by the Southern California section, the company's repair facility No. 80 for all types of repair work, complete service is available to provide operators of aircraft, to individual plant owners, and to fixed base operators in the Southern California area. Engine sales, service, and in-service aircraft wheels, propellers and batteries are also performed for several major air transport operators.

In its organization and operation Pacific Airmotive was planned at no to provide factors, service on equipment service, and to furnish a complete repair facility for the maintenance and to make the best type of service available to the travel there.

Despite the wide variety of planes or transports use the units which require the most service and overhead each is



Interior of a modern aircraft hangar.

parts stock worth about \$10,000 and employs the services of more than 6,000 different men.

From a modest beginning

The company started business last in 1926 with a staff of 10 persons, a location of only 1,000 sq. ft. floor space located in West Los Angeles, but not on an airport. Among the first sections represented were Wright Whirlwind engines, Hispano-Suiza, Standard, and Bessels propellers, Stromberg carburetors, and miscellaneous supplies. In 1929 the company was reorganized under California laws with

new, present name, and in August, 1930, the operating base was moved to Los Angeles Airport where a modern hangar and shop buildings had been erected with a total floor space of about 25,000 sq. ft. During 1930 a branch shop and service center was established at Glendale airport, and three additional service centers were opened in the state of California. In 1931 the company equipped for Kinner engine service and in October of that year was appointed factors, sales and service representatives for Pratt & Whitney, and Moore engines, and for Hispano-Suiza propellers. At that time the headquarters was moved to Union Airport, Burbank, where a hangar and shop building with



Acanthococcus leucostachys and *Encarsia opulenta* associated with *Acacia mearnsii*

36,000 sq ft of floor space was taken over. The total personnel at the Louisville plant is now 46 persons, including 19 men in the engine shop, 9 in the aircraft repair department, 3 in the propeller repair department, and others in machine shop, welding, and maintenance with present utilization of the capacity up to 80%. This is the second largest manufacturing plant in the country. Polymer Industries, our principal supplier of resins, has recently moved into a cluster of sites.

Setting right misat-

The skilled co-operator has been given by all manufacturers concerned in the development of all serving functions. Equipment has been installed that

approximately 100 hours for tempering steel parts, a 50-ton hydraulic press for straightening propellers, propeller straightening tanks, complete propeller grinding and balancing equipment, and a machine shop that is completely equipped with everything needed for engine overhauls. An example of the highly specialized equipment available is a hydrodynamic test stand which is a highly modified version of the test stand used by Wright in the 1920s for testing engines and rear main bearings of Wright Whirlwinds which proved so successful that the Wright Aeronautical Corporation first adopted it as a standard tool and has used it at their test stations. Other unique equipment includes a test stand which includes a vertical test developed for the final step for all Pratt & Whitney and Wright Whirlwind engines, a Wright Universal Connecting Rod Boring Tool capable of boring narrow and articulating rods for all radial or vee type engines, a dial indicator assembly of .00001 in., a Rockwell hardness tester, and a gage for measuring handle play on the rod assembly of Pratt & Whitney engines.

Among the tools for necessary repair there is equipment for testing carburetors and electrical apparatus. A special Brooks brake drum simulation rig is used in the wheel and brake department. Recently a dog chop bay has been added—3,000 sq ft of space in a double-decked suspended building equipped with air conditioning apparatus which maintains a constant room temperature of 90 deg and changes the air every three minutes.

the fuselage and the method of reducing the fuselage section for detail. Note also the high aspect ratio of the midwing and the narrow elevator chord.

The brake pedal problem

A few principles for foot pedals that may aid in standardizing their design

By Alfred H. Hofer
Fatty Manufacturing Company

THIS application of brakes and service pedals has been the cause of numerous fatalities to automobile manufacturers and to designer of wheels and brakes alike. As a matter of fact, service brakes are simple enough. They may be applied readily and operated efficiently when fitted properly into the frame. Difficulties have arisen chiefly from a lack of understanding between the manufacturer and the user.

Block of the trouble comes around the design of the footpedal. It happens that this particular item lends itself most readily to standardization, for, after all, the amount of pressure which a pilot can exert with his foot is about a fixed sum. To lay down a few principles for pedal design may serve to reduce the correspondence necessary between the airplane and the brake manufacturers.

Perhaps a brief history of the development of brakes might serve as a point of departure for the discussion. Strange as it may seem, the automobile is really responsible for the airplane brakes—the so-called "cage" or the design and application of the first brakes.

at McCook Field. A plane was used as parasites and the pilot spent all day loading darkness, climbing to a pragtic altitude and dropping them. At every landing the trap rail would valuable one which might have spent hours in trying luck for another load. Sister wife helped fit traps, and the writer also helped give the traps a good start building the first net, largely because he had designed traps for moths early in his career for the Was. In those early days arrangements the pencils were independent of the reader bar. The McCook idea was to complete the reader

her and the bridle point.

but, in building the first set it was found that many of the difficulties of straight type could be overcome by leaving the pedal. Then, the top edge of the pedal became another low rim, limiting the brake and starting at the

The pilot did not have much to do with the forward work but had his hands full with the radio. Field telephones were used to the station, and he had to be constantly available. The motions foreward and in the same plane avoided the tendency of the boat to ship off in one side, and it was almost as easy to apply as the in the first position as at

Group type is that it constitutes less space

Since the coefficient of friction of all tires on the ground is about 30 per cent, each brake would be required to hold 70 per cent of the weight of the airplane. Thus a plane weighing 3,000 lbs., equipped with a set of 12-wheel landing gear, would require to hold 210 lbs. per wheel, or 2,520 lbs. total load, and with a brake pedal ratio of 8.1, the force required of the pilot would be

The question soon rose, however, as to whether the toe or the bed was best used in applying the breaks. The toe method was the favorite, because greater economy is possible, and the means

The original test on bridge service tires at the government's test station, at the present time, consists of a series of tests of the following dynamometer. The wheels are driven from 30 to 60 mph by large electric motors and varying loads (from 20 to 250 lbs.) applied to the brake lever. A scale shows the amount of breaking. The maximum load can be applied to break

The longest total gait is 7 or 8 m, and the level at the break is more than 3° from 4°, so length (shorter as prealigned) it is possible to put a range state of about 2.1, a double step. Thus, specifications usually lead us to an allowed movement of 1 m in small bridle levers and 2 m in one

EDITORIALS

AVIATION

EDWARD P. WARNER, EDITOR

**Not so quiet
along the Potomac**

EVERY AIRSHIP is entitled to a slowdown in its cruise, and every airmen to a series of war flights, before its performance is formally judged. The administration in Washington has now passed through the slowdown period. Its purposes are defined. Its courses are set. They will be changed from time to time, but the general policies which President Roosevelt and his co-workers seek to promote and the sex of a country which they seek to assist, are now reasonably clearly apparent.

Furthermore we have started the new fiscal year, the first in which the planning of the new administration could have any pronounced effect. No sooner were the new forces in power in Washington than they began to shape their plan for a re-arrangement of the Government's spending, and a reorganization of the departments that fit the spending, immediately after July 1. We have reached that date, and the results of the planning have begun to appear. Now, for the first time, it is fair to appraise the effect of Democracy's access to power upon American aviation.

Five months ago, in the Prague of Prague, we addressed to the new President and his associates and to the new Congress a partial presentation and an appeal. The presentation was of the present state of American aviation and of the spectacular progress that it had made over the past few years. The appeal was for fair governmental treatment of the aeronautical industry and of the operators of aircraft, in order that the ground that had been so brilliantly gained might not be lost. Five months have passed, and now we can see what has happened.

When we look along the air line and scan the aircraft factories there is plenty of reason for optimism. The overall of progress that was record last March has been piled higher and higher with new achievements since that time. New planes and new instruments have made air transport more comfortable, more safe, more exact, more reliable, and more popular. Records for altitude speed have been broken repeatedly, and records for passenger and express traffic have been broken by even larger margins. But where we turn away from current operation and look

to the capital of the nation there is less occasion to be cheerful.

WE DISCOVER with distress and melancholy that the drive for economy has bitten more deeply into aviation than into almost any other major governmental activity. Aviation has been growing, and growing steadily. There has been every reason to expect its proportionate share of the attention of the American people would continue to increase. Yet the government's attention to aviation, as indicated by appropriations, has not merely stopped increasing and begun to decrease, but is decreasing much more rapidly than for other comparable activities.

Let us take an example. The Aeronautics Branch is charged with the construction and maintenance of airports, and with the regulation of American commercial flying and aeronautic navigation. Two years ago the total appropriation was \$10,850,000 for the year. For the present fiscal year Congress appropriated \$9,600,000, and the Secretary of Commerce by administrative decision has determined that only one per cent of that amount, or \$8,172,800, will be expended. Inevitably this means drastic reduction in airway service and research in mapping work. The officials of the Department of Commerce will give us everything that they can. They will stretch every dollar to the limit, but there is no longer much by which five million dollars can be made to do the work of eight or ten.

WE DO not for a moment suggest that aviation should be exempt from sharing in the sacrifices that the interests of government economy and the plans for economic recovery demand in every quarter. We must take our share of the general punishment, and before that we shall gain back all that we have lost and much more besides in commercial sales and commercial services as auxiliary programs, but we do take exception to making sacrifices for beyond the general run. Let us, for example, compare the figures just given for the last of the Aeronautics Branch with corresponding figures for the services that the Department of Commerce retains in the maritime service.

Take the Bureau of Lighthouses. The efficient high for lighthouse construction and maintenance up to a year ago was \$10,946,000, only 6 per cent above the highest figure for aviation. The fiscal cut that has just been made by the Secretary of Commerce still allows

\$8,672,000 for lighthouse work, or about 70 per centum than aviators is to receive. Furthermore, that sum is to be supplemented by a special allotment under the new public works administration of \$5,354,000 for lighthouses, while aviators receives only the about trivial sum of \$443,000 from the same source. To the regulation of aircraft corresponds the aeronautic inspection service. Before the depression the bureaus of navigation and of aeronautic inspection were spending about \$1,700,000 a year. For the present fiscal year they are being allowed \$1,070,000, a cut of only 25 per cent from the high, while aeronautics is taking a cut of just 30 per cent. Such illustrations could be multiplied.

THAT is but one of several reasons for feeling alarm. There is another in the air mail service, where the appropriation for domestic mail has been cut by Congress from approximately \$30,000,000 in each of the last two years to \$15,000,000 this year. We have more firmly than at any time in the past that American air transport is making steady and rapid progress towards a self supporting basis, and that it will still support within a very few years but we cannot exaggerate the bad effects of arbitrary cuts which will force reductions of service just as the airlines are really getting a proper grip upon the face of the traveling public. A 25 per cent cut is bad enough, but that is now written into the law. The ground that has been lost may be regained by deficiency appropriation at the next session of Congress, and in the meantime the loss will not be absolutely final if the reduced appropriations is widely distributed and widely administered. Unfortunately, however, there are previous reports that the director of the budget is dissatisfied with the way this has been done, and that he intends plans for another 25 per cent cut on top of the one already suspended. We are not judging the situation too harshly in estimating that anything of that sort would mean a very substantial postponement of the day when air transport will be able to stand on its own feet both as a direct government liability of any kind. The American people have become used to this service and they have no notion or giving up, but it must be made through the transition from a subsidized to an independent condition. The hemisphere's interest will not do, even from the point of view of economy.

In the sphere of military aviation there are no such definite figures on the new year's allowance as have been furnished by the Department of Commerce, but such information as exists is far from encouraging. The abolition of the aeronautic secretaryship for aerial matters was a disconcerting warning of a diminished regard for aviation in military and naval planning. The most or less forcible statements reported from the offices in the War Department to the effect that "we may buy an airplane now and then,"¹ and the

constant emphasis on the importance of ship construction in the Navy Department, have been additional warnings. No one knows definitely just how much of their appropriations for the current year the War and Navy Departments plan actually to spend on the purchase of aircraft, but it seems clear that they plan for less than the law allows them. From the public works funds come \$230,000,000 for surface vessels for the Navy, with only \$5,500,000 to be allotted for naval aircraft. Aviation gets but 5 per cent of the amount that is to go to ship construction. The aircraft industry has been making heroic efforts to carry on in spite of declining military markets, and to make up for difficulties at home by an increased effort in the export field, but there, too, a serious blow has been suffered in the virtual disbanding of the aeronautics trade division of the Department of Commerce. Its chief and its assistant chief are both out of the service of the government, its special aeronautics trade commissioners in the field have been summarily called home, and the aircraft industry will have to reorganize its export plans to get along without the valuable help that has hitherto been received from Washington.

Put it all together, and it makes for the moment a somewhat gloomy picture. If we do not believe that the plane is going to continue, it is because we have full confidence in the far-sightedness of the administration and its desire to serve the public interest. We are confident that the public interest demands the continued support of our rapidly progressing air transport, and a reasonable expenditure for the continued development of military aviation. We are confident that the American people will defend their voices here, and that administration policy will be subject to change, if we make a really clear what aviation is suffering.

We are as yet in the position of going to prove these claims from the inevitable "what if" analysis which is occupying our minds. The only course that we can take is to continue to urge the Army to complete its designator program, which gives work to a great many stable veterans who are in difficulty, that is to say, and that have been having a hard time to begin with.

Bigger and better!

PERHAPS the function of an editorial should be limited to interpretation, counsel, entreaty, and exhortation. Perhaps space in these three pages should be considered to be precious for any other use, but we can't stick to any such rule as that. Every now and then we are compelled to restrain ourselves from a souse of single exhortion, and an editorial has to be written which has no possible object except to point with pride.

Recently they started an exposition in Chicago. They invited to daily scientific lectures, with the help of a beam of light that had left Astoria 40 years ago and been on the way ever since. The light that was destined to throw the switch had already made a full

two-thirds of its journey before the first regular *Aeromaritime* air mail service was started. But on the day that it finally landed into Changsha, over 300 hours' visitors also served in that city—by air.

Expositions do American aviation a great service. The first transoceanic passenger service in the United States was started by private Philadelphia to carry visitors to the Sesquicentennial of 1926. In 1932 the Century of Progress is bringing to Chicago by air people who never before gave the slightest thought to the possibility of flying, and every week brings a new quota of sensational traffic records to a record. In the January issue of *AVIATION* the editor forecast a passenger mileage on American air routes of 175,000,000 for the present year, an increase of more than 30 per cent over 1932. After a slow start in the first four months, it looks as though that prophecy might be exceeded by a considerable margin.

Many Americans who had never thought of flying at all have in the past been converted to air travel by European experience. There is something about the holiday mood of the tourist that makes him willing to try a new form of transportation which he might never have thought of using in connection with his business. For that purpose, the Chicago exposition is replacing Europe. Fortunately this special spur to patronage synchronizes with the appearance on many routes of new planes setting a new standard in beauty, speed, and flying qualities. The greatest tribute that can be paid to American air lines now is an expression of our confidence in a service that gives so good, so efficient, and so comfortable a service that we can rely upon it that most of the travellers to and from the Fair who make use of the airplane even over such air trips can be recruited in converts who will fly at every opportunity in future. Air transport is taking, during the present summer, an other long step around the corner that leads to solid establishment as a major part of the American transportation system.

The Roman legions

fly westward

OUTSTANDING characteristics of fascism under Mussolini have been daring and dross. That is proposed to hold as enough to commend it to the fanatic Mussolini, and to Italy's Bullo the leader has a follower who fairly surpass him. The same flight around the Mediterranean four years ago seemed a colossal undertaking. The flight to Brazil was even more spectacular. Both appear magnified in the shadow that is cast by the voyage of 28 Savoia-Marchetti boats across the North Atlantic.

We have had plenty of chances to get used to the remarkable reliability of modern aircraft engines and flying equipment in the past few years. We have

STATISTICS OF THE MONTH

Supplementing the statistical news of *AVIATION*, March, 1933. Page numbers refer to that issue.

PRODUCTION AND LICENSING (From p. 71)

Total Aircraft and Motorcycles July 1, 1933	
Licenses	8,678
Manufacturers	3,211
Planes licensed	32,948
Motorcycle manufacturers	9,180

ALUMINUM PRODUCTION, as reflected by the reports of the Bureau of the Census. For the first year, having started the year as an insignificant factor in 1932 figures, by June had more than equalled the record of its predecessor. Completion of new plants, particularly for aircraft, for several of the major users has played a part. Returns from the two new units indicate a sharp and steady increase in the production of plates, serrated edges should go well over a hundred machines purchased, and so should Aircraft. The curves in the accompanying chart are based on first and third weeks to each month and include only the plants of reported capacity, including the basic builders and the makers of purely aeronautical aircraft.

FOREIGN TRADE (From p. 41)

RATINGS on all levels except the final rates of 1929 prosperity, exports of airplanes, engines and accessories during the last five months of 1933 totalled \$3,748,433. Saders of exporters abroad were largely responsible for this in-

FOREIGN TRADE (From p. 41)

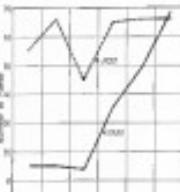
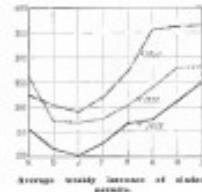
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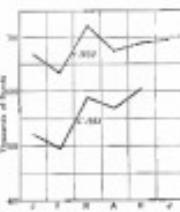
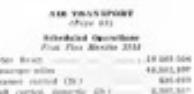
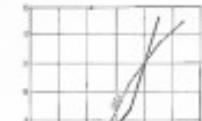
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crease of some 160 per cent over total aeronautical exports of the same period of the previous year. They amounted to \$2,612,761, the 1929 figure, more than double that of the corresponding 1932 figure. Imports of 37 and 49 per cent respectively, as exports of aircraft and accessories were relatively unimportant. Engine sales reached \$321,056, according to 1929 figures.

By far the largest customer of American aeronautical manufacture is the U.S. Army, which accounted for



Statistical review of scheduled air transport operations. Left: Air express; Center: Passengers traffic; Right: Air mail.

FHC-2 are destined for the High Altitude Squadron at the Naval Operations Base, North Island, San Diego, Calif. The contract amounts to \$100,000.

Diversified public works

As the Federal Emergency Administration of Public Works got under way on July 1st, work allocation of \$75,000,000 from the fund for projects throughout the country, started with almost negligible allocations to all branches of the service, amounting to \$29,000. The Bureau of Aeronautics of the Department of Commerce put \$140,000 for relocating and improving hangars and radio stations along the seacoast, while other bureaus, most notably the Budget Bureau, the Public Roads Commission, and the National Board of Fire Underwriters, each allotted \$50,000 for air fields and the National Advisory Committee for Aeronautics \$200,000 for

the Aeronautical Chamber of Commerce or the working of its board of governors on June 20 got under way as the trade associations reorganized. The aviation industry, under the chairmanship of the Industrial Recovery Act, has a new president, Major H. H. Fleet of the Consolidated company, who was elected a director.

Bulletin No. 7-4 reduces

To keep pace with advances in aerodynamic information and eliminate many of the arbitrary and detailed design requirements contained in the original Department of Commerce's plan, it was later decided that the Board of Governors would itself act as the code committee. All elements of the industry, manufacturers, transport operators, commercial operators, airports and seaports, and fuel companies are being consulted by a permanent and permanent committee before the finalization of the code, to be drafted late in July. At the meeting, Consolidated Aircraft Com-

pany and the Douglas Company announced their intention of becoming members, making the Chamber's representation in the aviation industry almost complete. Major H. H. Fleet of the Consolidated company was elected a director.

The claim of American Airways to exemption from payment of the airmail F-Suite tax was denied by a three-judge court composed of U.S. Circuit Judge Louis E. Poston, and Justices John C. Lodge and Fred C. Dashiell. Though the post office had been purchased outside the state and merely served as a clearing house, it was in reality the company's planes at landing fields in Louisiana were considered taxable, and not in reference of interstate commerce. A three-judge court in Denver also ruled in a Wyoming Federal District Court a few weeks ago [AVIATION, June], when Boeing Air Transport claimed exemption on the grounds that a smaller tax was unconstitutional as that it placed a burden on interstate commerce.

The U. S. Circuit Court of Appeals has postponed the decision of a three-judge court [AVIATION, April 1933] denying the claim of Robert Kennicott-Petrie against the Chance Vought Corporation for infringement of his stock control patent by the American company until October 1st. A case of Clinton in involving military planes and during the war is still pending.

Air race entries

Following a lull of several years, starting the Beechcraft Trophy Race which opened the 1933 National Air Races on a new high note, the Beechcraft Trophy, some 2,200 miles from Floyd Bennett Field to Municipal Airport, Los Angeles, in eleven hours 30 minutes minus 50 minutes losses due to the weathered record set by Jimmie Doolittle. The record for the flight from the English Channel to Japan, set by Bert Hinkler in his single-seater biplane, is an hour and eleven minutes faster. James Wills, designer of the Wasp-powered Wedell-Wyman racer which Colonel Terrell flew to victory, followed hard on his heels to second place in an elapsed time of eleven hours 50 minutes. The other contestants failed to finish in the allotted time.

Wills also gave "Tissue" his major competition in the Thompson Trophy Race, speed class, of the race meeting, and carried away the first prize when Terrell was unable to finish the first leg of the 100-mile race. He made 241.07 mph. just after circling the pylon a second time on the second lap as an effort to really hit his mark, but was eliminated by decision of the contest committee. However, he did not let the final round which included only eight of the 18 planes entered, was a decided change from previous practice. King's Cup races in the past were flown in a lengthy series over most of England.

Steadfastly refusing to give up, Wills again entered and returned to the Fourteenth Annual Royal Air Force Display at Hendon on June 24. However, the heavier precision of the formation flying, aerobatics, and other demonstrations which were always the specialty of the English drivers, triumphed over the skill of our drivers, and Terrell was taken off with a third place. Wasp Jr., Wills averaged 220 mph. for a third Wedell-Wyman score, held for last year's races. Wasp Jr.-powered and flown by Len Gelbback, took second place. Ray Major flew the Howard Special, with Missouri B-2 as a particularly fast race in third place, followed by George

Hagas in a Missouri-powered Keith Ryker and Z. D. Graveline in one of his stock model spotters. The Gee Bee Racer, one of which holds the record for the fastest mile ever run which was expected to be a real competitor in the Wedell-Wyman entries, was both damaged in landing en route to the coast in the British race. All six entrants in the Thompson event will appear before the U. S. A. court on August 10 in having an injunction issued against the race, appealed by General Tamm.

In the 500 en route, also being held in a new plane in line with the record by Roy Minor, but always close passed by the Wedell-Wyman Special, with a Pratt & Whitney engine. Les Miles took most of the victories in the 500 en route, driving the Missouri-powered Miles B Advanced Special, with George Blaauw at the smaller Kestrel engine. Miles usually only a few yards behind the lead car, took a half mile lead over 500,000 for the first time since 1930 when a ten-day record was held at Chicago.

At the American Air Races in Chicago, John Livingston and Ann Townsend, Wisconsin-powered Curtis planes, respectively, won first and second places in the female. Livingston's plane was clocked at 220 m.p.h. on a straightaway course.

British air races

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BEPUTTY

Midwest plane producer of Midwest racing aircraft, the Wedell-Wyman Special, has been made Deputy Administrator of the National Defense Aviation Act.

Wedell-Wyman with 300-kp. Bristol Rover, and Hawker Hurricane powered with the Rolls Royce Condor, 1112 which develops 480-kp. in its modified heavy-form.

To demonstrate aircraft built in Great Britain and Scotland, the Royal Air Force Aerobatic Team, October 19, 1932, a British Aerobic Mark has been established. Application of the mark, which consists of a thin ring composed of white circles of red, white, and blue with the words British Certificate of Airworthiness, in the white ring, is submitted by the Secretary of State for Air.

General Airlines grows

Largest chapter in the history of the North American Aviation-General Aviation Manufacturing family is the consolidation of the U.S.A. Aircraft Corporation, a North American subsidiary since 1928. In manufacturing aircraft, commercial and military, the U.S.A. will be amalgamated with that of General Aviation which is at present occupied with the production of high-speed transports for Japan and Switzerland as well as for Pan American Airways. Builder of the YP-16, first two-seat fighter to be used by the Army Air Corps, the YP-16 project is now well along toward completion and two-seat fighters for the SB2C as well as two-seater observation



experimental work, and equipment of Langley Field. In the addition of the Department of Commerce funds the Armstrong Branch also has come out on the short end. It will be allowed \$5,172,000, barely less than the amount appropriated for it by Congress.

The development of aircraft as auxiliary fleet auxiliaries to the fleet is included in the "second to none" serial program of Secretary Stevens, and the construction of airplanes to bring the Army Air Corps equipment up to the standards of the Air force program. In 1932, said by Secretary of War Davis as part of the public works program, as yet no contracts have been forthcoming.

Aviation's role for the NRA

Adopting the organization plan previously outlined by its President Thomas A. Morgan [AVIATION, July 1]



THE TWENTIETH CENTURY TRANSPORTATION

Dominion Institute of the American Airways exhibit at the Central of America Exposition is a tape map on which the routes of each plane in flight to night in the day shown. United Air Lines exhibits its airline business with an informative map of routes of many English railroad operators.

phones. Joseph S. Duren, an engineer at Lockheed Aircraft, R.J. predecessor, will become executive vice-president and general manager of General Aviation. F. S. Hinkley, also of the corporation, is to be his assistant. J. M. Schlesinger Jr., controller, is president.

Consolidated goes west

Consolidated has been based at Lind Field, San Diego, as a new plant and assembly center for aircraft. Its Consomore freighter, Bomber transports, fighter Fleet fighters, and various military types are now made in Buffalo.

Increasing use of the Department of Commerce radio liaison and cables by air mail is responsible for the push in the field of airmail, recently shown by Western Manufacturing Co. of Glendale, Calif., no more than 25 a month. Originally used exclusively in transports, about half the installations are now being made in privately owned planes.

Personnel

Philip G. Johnson, president of United Air Lines, was recently elected president of United Aircraft & Transport Corporation to direct the operating activities as well as the engineering activities of the two companies. George F. Stranahan, who succeeded Johnson as chairman of the board, is a new office just created by the directors.

Bureau orders have brought back from sea duty to service at the Bureau of Aeronautics Corps, Robert H. Faurot, Lt. Col. (D), and Lt. Col. Dan L. Li. Col. John J. Ballouette and Lt. Col. James B. Series.

Capt. John H. Tammes was selected of staff and commander of aircraft of the Battle Force, has been ordered to the Naval War College at Newport, R.I., for further study.

Lt. Comdr. Charles P. Moran or the U.S.S. Langley has been made executive officer at the Naval Air Station at Norfolk, Va.

Major Jack Berrill has returned to Cleveland as manager of the Cleveland Aeroplane Co., which held some partners from 1928 until now. He said when he tendered his resignation

MURRAY P. of New York writes that he is now getting up an organization, probably in the San Joaquin area, to manufacture light aircraft for pleasure. Apparently he views aircraft as low cost from the flying which he envisions—using the technical descriptions in another announcement concerning an amateur aircraft recently developed. We quote from the clipping: "An amateur can get the low cost aircraft described in the latest issue of Popular Mechanics."



seats or the weather is quoted as problem. "The gyroplane should revolutionize aviation and furnish a new era in aerial transportation." At present a license has been granted to builders in Los Angeles and these New York gyroplanes should make it possible to start in this field.

All amateur radio enthusiasts of this kind of progress are encouraged to do their share in the interesting development of aviation, and we urge you to do your best to help make this hobby as popular as possible.

Instead of the usual box, the Intrepid Aviator prefers a biplane if one engine is to be passed through one after another. He says that the engine is not needed there for greater economy. In clipping which he left on the desk in explanation stated that "one of my flight engineers dropped from an airplane at 10,000 feet while in a seat in biplane, three others were found in the general afterward still living."

In a recent magazine interview an aircraft flying enthusiast said that from her observations, was never merely to put from one place to another as quickly as possible and spent very little time looking at the sky. On the contrary, she would prefer to fly for the pleasure of flying and would naturally highlight with the scenery below.

He has not yet tried this particular flying because, but if she will try it for



photograph, we may be able to make other enthusiasts why the men spent little time looking out of the windows.

In her analysis of types of passengers we were surprised to find that the busier referred to above did not mention the very serious type of passenger—the one who grasps the arm of his chair at the place he pulled off the ground who fails his liegeants and looks all around him nervously when the plane begins to roll over. This is the person who nearly jumps out of his seat when the plane is stalled down for a landing. That very uncomfortable person is the pilot who has to make a trip along the line with another pilot at the controls.

A recent issue from the Los Angeles Times tells about the development of a new type of airplane propelling device, called a "gyroscope." One of the in-

SIDE SLIPS

By Robert R. Oshara

Two Junkers transport planes

SUCCESSFUL operation of the two-seater Junkers G-38 by the German Luft Hansa throughout the summer of 1937 on the Berlin-London route, encouraged the construction of a six and twelve seat versions of a similar carrying capacity. Designers of a derivative of the famous Junkers G-38, the Junkers Ju 50, have made available so that the new machine will seat 24 passengers instead of 25 in order to give the maximum utilization of the aircraft's interior space.

The large room, situated after the rear section of the fuselage represents a definite step toward the long-pending trans-oceanic transport aspiration. This space made available makes the forward cabin is used for storage or freight.

The other major change has been in the wing planform, which is increased with each of greater power developing the total 40,000 ft. 2,200 hp to 2,600 hp. In spite of the increased weight of the new power plants and the additional angle in the trailing changes are necessary in position of supports to 20 degrees. The new wing is expected to increase the range in gross weight (consuming, to about 35 per cent) will raise the loading speed but is making certain changes in the adjustable wing flap is necessary in landing speed of considerably over 10 per cent.

All lockers arranged from the two-place 30-hp Junior to the three-place

of four longitudinal spur tubes carrying the cross-tubes and bulkheads. All structural members are of the open type to facilitate inspection. Except for the changes mentioned in the adoption of the smooth metal anti-collision, the general practice followed in the original Junkers design, the engine mounts and the wing panels are retained to the heavier structure proper through Junkers-type bolt joints. The larger wings will be built around main spars.

The undercarriage version uses the long strut pair on the wing by swinging upward and outward to the side. The main wheels are mounted on a single axle, American practice as typified by the Boeing 247. About half of the wheel diameter projects below the housing where the external pointed hub cap and nose pants and fenders follow behind such wheel for a reasonably good shock absorber.

The Ju 50 accommodates 24 passengers and two pilots. Four of the passengers face forward and two on a bench across the forward bulkhead, here also. The details of the seats (strength, fabric, headrests) are worked out, but due to the various requirements of the various passenger needs for below average standards of comfort and convenience. There is no ride when walking around the cabin, the furniture is held down in about 20 m.p.h.

The framework of the fuselage consists



THE AIRS, NOVEMBER 1938. SEE JACK BLISS

FLYING EQUIPMENT



Junkers Ju 50 transport plane of Luft Hansa

sets of four longitudinal spur tubes carrying the cross-tubes and bulkheads. All structural members are of the open type to facilitate inspection. Except for the changes mentioned in the adoption of the smooth metal anti-collision, the general practice followed in the original Junkers design, the engine mounts and the wing panels are retained to the heavier structure proper through Junkers-type bolt joints. The larger wings will be built around main spars.

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The framework of the fuselage consists

of the long overall, 38 ft. 6 in. span, 47 ft. length, 11 ft. 6 in. packed, 1,395 lb. weight loaded, 6,890 lb. range approximately 620 miles.

Stearman 81 on floats

ON PAGE 186, AVIATION JUNE 1938 appeared a complete description of the new Model 80 biplane pro-



Winnemucca 81 via The White

closed by Streamline Aircraft of Wales for general business and sport use. A slightly modified tail was fitted Model 33, but it remained here until an improved version was ready.

The first modification was made with very little alteration to the basic structure; the number of struts which strengthen points of attachment for the oleo legs of the landing gear were used for stiffening the rear fuselage. This was followed by a pair of extra fittings on the lower fuselage provided for the rear seats. Standard Edo water caskets were used. At the Model 33, a Pratt & Whitney T-34-Wair, a 320-hp engine was installed. A Hammon Standard controller was supplied; the latest design was also fitted.

Under active development for the last eighteen months and is the outcome of some seven years of research work by the British Aircraft Company. It has

British engine with compression ignition

THIS Royal Air Force display at Hendon on June 28 was the scene of the first public appearance of Britain's air-cooled compression ignition engine. It was fitted in a Westland Whirlwind flying-boom type. The engine has been



New view of the Roland Phoenix,
a new British compression ignition
engine. Note the markings of the
heat zones and the use of an
expansion chamber.

under active development nor the last engines installed and is the outcome of some seven years of research work by the Bristol Aircraft Company. It has



African and His Law, by Harold J. Brown, Robert O. Baldwin, New York, 1933, 128 pages, 25c. The price twenty

printed in considerable detail. To the critics of *Health* and the advocates of world-wide efforts of airlines and shipping, the volume can be unreservedly recommended for reading. Laymen will form their own opinions of its merits, but at least the review can recommend very strongly that they should not fail to examine it. Among other virtues the book possesses admirable indices of the general subject matter, of the states ruled by bacteria, and

The Book of the Sky, by Harlow Shapley, P. Dutton & Company, New York, 1904, 552 pages. \$1.40.
From the point of view of a student of meteorology, and of light and color. Several chapters are devoted specifically to such topics as sunsets and sunrises, but they are much less extensive than the chapters on the causes of the various forms of clouds, the causes of winds and clouds and why they occur. For the greater part however no particular value, even on the meteorological side of it, is not sufficiently detailed and specific for their purposes. For the student of meteorology it is better to learn something about the medium in which he travels, on the other hand, it will make perception and reasoning easy reading.

TRANSPORT

Operations and Traffic Management

Keeping industry's wheels moving

MODERN armamentics and transportation systems can find industrial applications with many incidental benefits. Not long ago a cracked cylinder head on a six-cylinder diesel engine operating in emergency machinery at the coal-mining district of New York City necessitated a serious trip. At 2:30 p.m. a quick-thinking engineer put through a phone call to the regional manager at Cleveland, describing the difficulty and placing an emergency order for a replacement part. In spite of the fact

university before the Malibù episode could leave the plane, the finished casting was sent off to the Roman Catholic Archdiocese of New York by truck in time to catch a 4 p.m. plane for New York. The man and weight of the plane offered considerable difficulty in stowing away in the airplane's luggage compartment, but the ship got off

It seems there was an
age according to which

Teaching the young idea

REALIZING that the children of today are the potential leaders of the future, Lufthansa, Germany's private airline, has mounted one of the biggest child-training programs



Tomislav Grgurevic writes that he's had impressions from Dark Skies in "The Balkans."

Sum:	\$100
Round 100.00 (per 4.5%)	10
Round 100.00 (per 0.01)	1
Intermediate 101.00 (per day)	20
Total:	\$114
By customer transactional	
Sum:	\$114
Round 101.00 (per entry)	10
Round 100.00 (per 0.01)	1
Intermediate 101.00 (per day)	20
Total of trans?	100
Total:	\$110
Actual Cost:	\$11
Rating:	1991
-5% minimum daily rate of 4.00 per day	

of regular United Air Lines and Western Air Express schedules, was able to connect nine of his charter flights in seven days at a total cost of less than \$1000 that would have been required by more surface transportation.

time. This was appropriate, not only for the method of landing, but also because his company had no experience and material for repair and maintenance. It is obvious that a great deal of time was saved which might otherwise have been spent in repairing damage to the aircraft at the downtown pier. Structures were arranged so that all areas personnel involved met at the field at the time of the arrival of the plane by which Mr. Hall was rescued. Meetings were held before regular port officials or agents or heads of visiting airplane, in connection with the take and decommissioning were carefully made from the loading platform alongside the ship. In bad weather, when arrangements the meetings were held in the airport administration building.

THE BUYERS' LOG BOOK**AVIATION'S Card Index of New Equipment**

This department is enclosed to help readers better understand all types of parts, accessories or materials.

ACCESSORIES**Bearings, ball***The Fairey Flying Company,
Eastbourne, England*

THIS is a series of double and aircraft ball bearings built in sizes which have been extended to cover the range from 1/8 to 1 1/2 inches. The range of demand for similar bearings with smaller outside diameters than the KIC Aircraft series is introduced in 5, 4, 1 and 1/4 inches. Both series have metal seals; extended outer rings are preferred and corrosion plated. (Aircraft Casting) *Aerotech, August 1931*

ACCESSORIES**Nuts, self positioning***Industrial Engineering Company,
300 John Street, Bradford, Penna.*

SSELF-LOCKING, a patented device to prevent the use of nuts when screws are taken at locations where nutless nuts cannot be removed and held by driving. Automatic holds set in proper position with respect to hole and prevent re-tightening. Made for use round, flat or oval. Standard head screws in oval or oval. Useful for attachment of skins, spindles, nuts, fairings, etc. *Aerotech, August 1931*

AEROTECNICS, August 1931

AIRPORT EQUIPMENT**Hose, gasoline***B. F. Goodrich Rubber Company,
Akron, Ohio*

ANY-YEAR rubber covered gasoline hose with high-proof (100-octane) ratings. Made of tough black rubber and has a steel band can be easily stripped and cut and is flexible and durable. Made of high grade materials, it is a rubber core covered gasoline stream. Pressure strong, recommended for heavy application rate, and non-damaging. *Aerotech, August 1931*

AEROTECNICS, August 1931

AIRPORT EQUIPMENT**Lights, flood***14th Floor, 42nd Street, New York City, N. Y.*

THIS new Type 20000 G.R.I. landing flood light is for 1931. Last year the 20000 was 150 watts. This is not just superfluous. It is 26 feet from the Aerial motor case, and about one foot from each end yield and take and two terms. Wings. The apparent heat coefficient is approximately \$400,000. A clear glass or a divergent lens with a 30 deg spread may be furnished. *Aerotech, August 1931*

AEROTECNICS, August 1931

MATERIALS**Lining, fuel tank***Thiokol Corporation,
140th St., New York, N. Y.*

THIOKOL, a compound of sulfide, dichloro and trichloro polyethylene, has been tested as a lining for each type aircraft fuel tanks. (See Vol. 4 No. 14, Air Commerce Bulletin U. S. Department of Commerce) results that Thiokol-lined tanks may be about 25 per cent lighter, and may be cleaned about twice as fast as other types of considered dark aircraft lining. *Aerotech, August 1931*

RADIO**Course indicator, visual***Metropolitan Electric & Manufacturing Company,
Five Parkway, Pa.*

DUAL TWIN indicator for instrument board mounted for radio range beacon reception. Pointer shows its course to right or left and equipment may be adjusted to fit a course at any predetermined angle to beacon course. Operates from single tuned radio frequency receiver in compact mounting. Vibrating wire timer permits simultaneous visual reception on other frequencies. *Aerotech, August 1931*

RADIO**Receiver, airplane***W. L. C. Manufacturing Company,
1114 South Sixty-Fourth Street, Brooklyn, N. Y.*

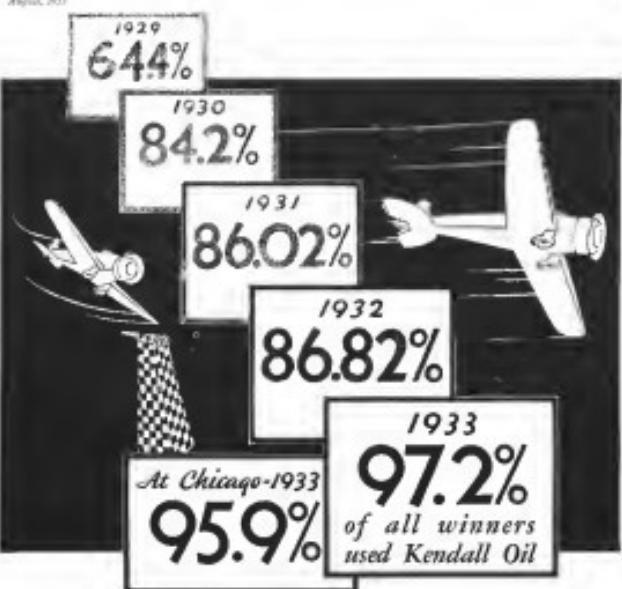
ANGLO-AMERICAN has brought out a compact radio receiving set for private aircraft use having a range of over 225 miles. It is a vacuum tube set with a 100-watt transmitter and receiver, located transmitter for 12 volt battery operation. Two tubes are used. Dimensions 44x6x10 or without receiver bracket. Weights complete with tubes and accessories, 33 to 35 lbs. *Aerotech, August 1931*

AEROTECNICS, August 1931

SHOP EQUIPMENT**Drill, electric***Independent Precision Tool Company,
100 West Jackson Boulevard, Chicago, Ill.*

ASMALL, hand addition to the regular line of Thor electric drills has been announced. This tool has all the characteristics of the larger models, and will handle drilling up to 1/4-in. diameter. Body complete at the Thor plate the motor is equipped with hand forward and hand-reversed ends, and armature is mounted on ball bearing-in bush rods. Used for light sheet metal work. *Aerotech, August 1931*

AEROTECNICS, August 1931

**NO OTHER OIL IN THE WORLD
EVER MADE A RECORD LIKE THIS!**

FOR six straight years Kendall has been used in more winning planes at the National Air Races than all other oils combined . . . yet, several times as many as all other oils combined. And this year with a greater lead than ever before . . . 97.2% of all winners used Kendall.

And at the Americas, the Aces Races in Chicago,

KENDALL
THE 30 HOUR OIL

MERELY MAINTAIN THE PROPER OIL LEVEL

Kendall reported its winning record by being in 95.9% of all the winning planes—over every year since the showing made by all other oils combined.

Certainly here is positive proof of Kendall's remarkable superiority. For in air races, where open throttle and climbing speed is the order of the day, it takes a real oil to stand up and bring in the winners. Kendall does it . . . has kept right on doing it ever since the National Air Races became the Nation's great air event of each year.

Follow the winners . . . use Kendall, the 30 Hour Oil. It wins in every oil.

KENDALL REFINING COMPANY
BRADFORD, PENNA.

there's nothing like
TEXACO MARFAK
on this tough job



"Nothing can compare with it," say the operating men and airplane mechanics who have tried out and use Texaco Marfak Grease for difficult rocker-arm lubrication. It is a superior lubricant in every way.

Texaco Marfak Grease has extraordinary lubricating qualities under temperatures and pressures that quickly destroy the usefulness of ordinary greases. It lasts longer, by far, and has the power of clinging to the bearing surfaces and stay soft. Texaco Marfak Grease is a mineral oil lubricant without a trace of filter. Try it. Leading commercial air lines use Texaco Marfak Grease exclusively.

You will find the well-known Texaco Aviation Products, including Texaco Marfak Grease, available at principal airports everywhere.

THE TEXAS COMPANY
135 East 42nd Street, New York City

TEXACO



* TEXACO MARFAK GREASE & BIPLANE AIRPLANE
OIL & TEXACO AVIATION GASOLINE & TEXACO
AVIATION FUEL & TEXACO MARFAK PRODUCTS
For Service, Hangar Flare and Repair and Drill Supply



ALL ENGINES,

with one exception, participating in the 1933
National Air Races at Los Angeles were B. G. equipped.

Of the 335 aircraft engines on the field during the period
of the races, 92% were B. G. equipped.

At the American Air Races, held at Chicago, 31 out of 38
engines in the competition were B. G. equipped.

All winners, runners-up and thirds were B. G. equipped.

THE B. G. CORPORATION

Contractors to the United States Army and Navy and Aircraft Engine Builders

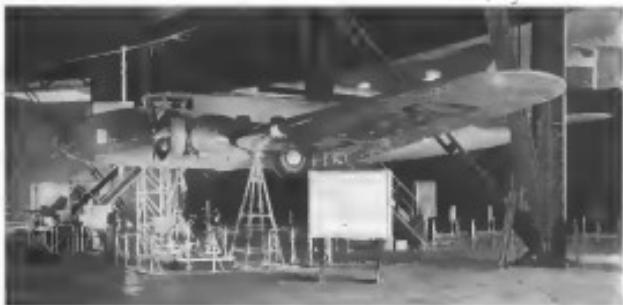
136 WEST 23rd STREET, NEW YORK. Cable Address: Golstein, New York



Patented in the
United States
and other countries

Climaxing a century of travel progress

THE BOEING 247!



What could be more representative of the last word in transportation than the new "three-mile-a-minute" ten-passenger Boeing 247? . . . That is why it is on display in the dome of the Travel and Transport Building at the Century of Progress Exposition in Chicago. . . . Specifications of the 247 sent upon request. Boeing Airplane Company, Seattle, subsidiary of United Aircraft and Transport Corporation.



*BOEING has always built
tomorrow's airplanes today!*

PIONEER INSTRUMENTS
PIONEER INSTRUMENT COMPANY INCORPORATED
BROOKLYN - NEW YORK - A SUBSIDIARY OF THE RENDIX AVIATION CORPORATION



The Straightflight, Pioneer's latest addition to its extensive line of compasses, adequately meets the exacting duties for which it was designed. For many years pilots felt the need for an accurate navigator's compass...particularly on long flights where course-check with established landmarks was not possible. And now, with the current system of "flying solely by instruments," the Straightflight attains even a greater importance as a directional instrument. Combined with the usual Pioneer features, the Straightflight embodies individual qualities which effect the desired characteristics for an ideal navigation compass...steady card...long period...no overwing. These results are produced by maintaining a strong magnetic control over an extremely light and well-damped card. A spring suspension protects the card, pivot and jewel against damage by vertical vibrations, and the new Pioneer anti-vibration mounting absorbs the horizontal vibrations which usually cause swaying of liquid and card oscillation. A large card, provided with parallel lines, makes it possible to take an accurate reading at a glance. The finest testimony to the Straightflight is exemplified in its approval by Army, Navy and transport pilots.



Better control for higher speeds

There's an infallible solution to this problem of positive control no matter what the speed—use Fafnir Ball Bearings. The "feel" of controls never varies through hundreds of flying hours—never tighter—never looser. With a ball bearing control system, you enjoy lasting smoothness, dependability and operating economy.

With aviation engineers, Fafnir studied the problems involved. The resulting designs have stood the test of aerial performance and are today specified by many of America's leading aircraft builders.

Whether it be for surface hinges, pulleys, bell cranks or any of the other numerous motions involved in control, you will find that Fafnir has the answer. The complete line is described in detail in the new Aircraft Booklet. As many copies as you can use are yours for the asking.

• THE FAFNIR BEARING COMPANY, New Britain, Conn.
ATLANTA CHICAGO CLEVELAND DALLAS DETROIT
EDMONTON MILWAUKEE NEW YORK PHILADELPHIA



Fafnir • Ball • Bearings



UNITED AIR LINES STANDARDIZES ON HAMILTON STANDARD CONTROLLABLES FOR ALL ITS NEW BOEINGS



Hamilton Standard Controllables equipped originally showed such have been adopted for the entire fleet superiority in every phase of performance that controllable of Boeing Transports pitch propellers are flying United Air Lines now standard for all. routes. The ships so



HAMILTON STANDARD CONTROLLABLES
ARE NOW IN USE BY, OR ON ORDER
FOR, THE FOLLOWING AIR LINES

A. B. Aerotransport (Swedish)
Cana National Aviation Corp.
Danish Luft Liner, A. G.
Pan-American Airways
Pan-AmericanGrace Airways
Royal Dutch Air Lines (K. L. M.)
Swissair
Transcontinental & Western Air, Inc.
United Air Lines

ACTION
August, 1931

It takes a
LOCKHEED
to beat a
LOCKHEED

The traditional ability of a Lockheed to keep on breaking records is the most emphatic answer to why commercial airlines continue to use and to buy Lockheed equipment. Lockheed Aircraft Corporation, Burbank, California

AVIATION
August, 1931

"They" made it!

Wiley Post and 5 double-range products in record-making world flight



Mobilgas . . .
double-range fuel
gives the "Wiley Post"
plane the power and
endurance of the real
airmen.

Soccony-Vacuum
Aviation Instrument Oil . . .
gives increasing protection to
aviation instruments—indicators, magnetos,

Soccony-Vacuum
Compress Fluid . . .
the new non-inflammable
fuel for aircraft engines.
Post's "Wiley Post" airplane
uses Soccony-Vacuum
compress fluid.

Mobilgrease . . .
heavy motor areas with
long life for aircraft
engines. Reduces friction
losses more than 30%.

Mobiloil . . .
protection in all kinds
of weather to the wings
and fuselage of valuable
aircraft.

7 days, 18 hours, 49 minutes . . . New York to New York . . . with stops in Germany, Siberia, Alaska! Wiley Post relied on the double-range feature of 5 Soccony-Vacuum products in establishing the round-the-world solo record. He knew this feature meant endurance under all kinds of punishment.



Mobilgas, Mobiloil, Mobilgrease,
Soccony-Vacuum Compress Fluid and In-
strument Oil . . . again these products
—by giving full power and protection at
hot or cold temperatures, at high or low
altitudes—proved their double-range
abilities. Look for Soccony-Vacuum prod-
ucts at established airports.

Mobiloil

SOCONY-VACUUM CORPORATION

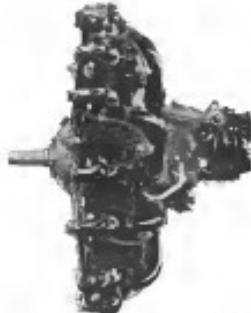
Mobilgas

On another outstanding flight

BREEZE

EQUIPMENT

plays a major role



WAFF ENGINES of the "Winnie Mae" equipped with
BREEZE SHIELDED CONDUIT and FITTINGS

Careful planning and preparation were major factors in the success of Wiley Post's record making flight in the "Winnie Mae." The best and most dependable equipment was used. Logically, BREEZE RADIO IGNITION SHIELDING, BREEZE SHIELDING CONDUIT and BREEZE NON-MAGNETIC TACHOMETER DRIVE were selected for the "Winnie Mae."

The use of BREEZE equipment on this and other noteworthy flights as well as on ships in all classes of service is the result of its universal recognition for dependability under the most exacting conditions.

Other BREEZE Equipment

BREEZE AEROFLEX FUEL AND OIL HOSE

A light in weight, strong and flexible hose. It has been specially designed to meet the different conditions existing in aircraft service.

BREEZE TIE RODS

One longer side and several intermediate. This construction is available for both manual and automatic applications involving some intermediate wear.

BREEZE IGNITION SYNCHRONIZER

This instrument readily checks the synchronization of two engines in dual engine airplanes. It is positive and quickly constructed and always accurate.

BREEZE TACHOMETER DRIVES are available in numerous sizes to accommodate any, and also in the rare non-magnetic type such as was used on the "Winnie Mae."



BREEZE SHIELDING, CONDUIT and FITTINGS are especially made for shielding and breaking off light and power leads as required.

BREEZE CORPORATION INC.
NEWARK . . . NEW JERSEY



ROUND THE WORLD with the Automatic Pilot



"The days when human skill alone and an almost Judd-like sense of direction enabled a pilot to hold his course the long hours through a stormy night are far gone. The Commercial Flying in the future will be automatic."

Quotation from M. Y. TIMES
Editorial of July 26th, 1932.



SPERRY GYROSCOPE CO., Inc.
BROOKLYN — NEW YORK

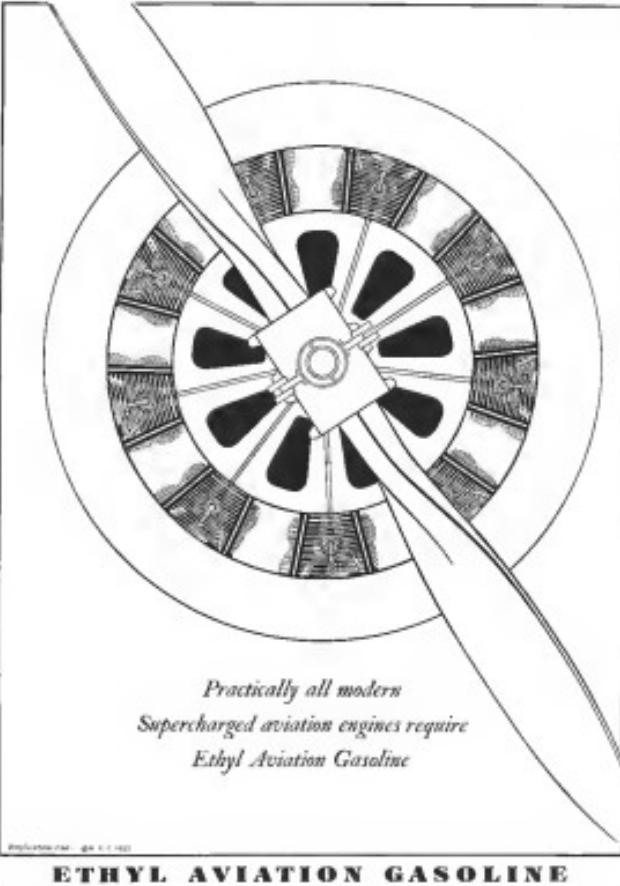


Illustration by Fred G. Smith

ETHYL AVIATION GASOLINE

A Stinson powered by Lycoming. See how it compares with the other planes in this issue.

Veteran Commercial Flyers Prefer Stinsons

The Veteran Flyers around whom all private flying centers on the airports of the country know their airplanes.

Years of experience with this and that type of aircraft has well fitted them to choose the plane which gives the best all-year-round service at the lowest cost.

Here's a significant fact. Eliminating absolute "option" types, there are more Stinson cabin planes, Powered by Lycoming, in constant use by commercial airplane operators than all other makes of modern four-passenger cabin planes COMBINED.

Be guided by the experience of these Veterans of the Air.

Their motto is—"LEARN TO FLY IN THE TYPE OF PLANE YOU WILL EVENTUALLY BUY"—and the Stinson, Powered by Lycoming, best answers their purpose for all commercial airplane activities.

Choose the 1933 Stinson "Reliant" which is now outselling all other makes of four-passenger cabin airplanes COMBINED, because it costs less to buy and to operate and offers the utmost combinations of safety, reliability, speed, comfort and beauty.

A copy of STINSON PLANE TALK, fully describing the "Reliant," is yours for the asking, mailed free—postpaid.

STINSON AIRCRAFT CORPORATION
WAYNE, MICHIGAN
Division of Ford Corporation

BOYS

Build a Stinson "Reliant" Model
\$500.00 CASH PRIZES

There is a chance to demonstrate your ability—Build a scale model of the Stinson "Reliant" plane from Balsa wood or any other suitable material. You cannot purchase. Call the Stinson Aircraft OPERATED STINSON AIRPORT for details. If there is not an Aeronautics office near you, write to the Ford's Central Department, Michigan Avenue Extension, Wayne, Michigan, for full information.

MORE THAN EVER—THE AIRCRAFT STANDARD OF THE WORLD

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HURLEY-TOWNSEND CORP.
305 EAST 45TH ST., N. Y. C.

Ready in September—

New Fourth Edition

This book which has been a well-known and standard text in its field for eighteen years, has again been fully revised and enlarged to bring in the newest development in the design of aircraft combustion engines.

Internal Combustion Engines

by WILHELM A. SPERBER and THEODORE PETER TISCH
Associate Professor and LESTER CRAIG LIGHT, Associate
Professor of Mechanical Engineering, TECHNISCHE Hochschule
DARMSTADT, Germany. 416 pages, 6 x 9. Illustrated. \$10.00

THIS book presents a well-balanced treatment of thermodynamic analysis and design. Very little descriptive material is given; the treatment is fundamental and can be applied to all types of engines. Many illustrative examples are included. The present edition follows the same general form as the old edition, but has been thoroughly revised and brought up to date and much new material added. Some features of the revision are:

Chapter Headings

The present edition includes the following chapters:
1. Thermodynamics of Internal Combustion Engines
2. Heat Transfer in Internal Combustion Engines
3. Internal Combustion Engines
4. Design of Internal Combustion Engines
5. Materials and Methods of Construction
6. Fuel and Lubricating Oils
7. Lubrication and Lubricants
8. Internal Combustion Engines
9. Internal Combustion Engines
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Lady Grace Hay Drummond-Hay took off from the Waco Flying Field at Troy, Ohio, for New York in a Waco-Caledon Plane. In New York, her new Waco was placed across the dock of the Empress to start its journey back to England.

Recently Lady Grace Hay Drummond-Hay took off from the Waco Flying Field at Troy, Ohio, for New York in a Waco-Caledon Plane. In New York, her new Waco was placed across the dock of the Empress to start its journey back to England," says Lady Hay.

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